

In the Claims:

1. (Currently Amended) A receiver for a multi-carrier CDMA system for receiving a signal transmitted on plural sub-carriers each having a known pilot sequence, comprising:

a plurality of down-converters down-converting the received signal to different data baseband signals;

a delay and channel estimator correlating at least one of the different data baseband signals with a single wideband pilot signal, the single wideband pilot signal comprising [all] more than one of the known pilot sequences, to produce an estimate of channel gain and multi-path delay; and

A2 a plurality of demodulators, one for each of the plural sub-carriers, and operatively coupled to the delay and channel estimator, each demodulating one of the plural different data baseband signals using the estimate of channel gain and multi-path delay.

2. (Original) The receiver of claim 1 wherein the plurality of down-converters comprise one for each sub-carrier.

3. (Original) The receiver of claim 1 wherein the plurality of down-converters comprise a plurality of sub-carrier down-converters, one for each sub-carrier, and a composite down-converter down-converting the received signal to a composite baseband signal.

4. (Original) The receiver of claim 3 wherein the delay and channel estimator is operatively coupled to the composite down converter for correlating the composite baseband signal with a composite of the known pilot sequence to produce an estimate of channel gain and multi-path delay.

5. (Original) The receiver of claim 1 wherein the delay and channel estimator comprises a plurality of correlators, one for each sub-carrier, and outputs of

each of the plurality of correlators are combined to produce the estimate of channel gain and multi-path delay.

6. (Currently Amended) The receiver of claim 1 further comprising a plurality of correlators, one for each down-converter, each correlating one of the baseband signals with the known pilot sequence for one of the sub-carriers, to produce an estimate of channel gain and multi-path delay, and wherein the plurality of demodulators selectively demodulate the ~~plural~~ different data baseband signals using either the estimate of channel gain and multi-path delay produced by the delay and channel estimator or the estimate of channel gain and multi-path delay produced by the plurality of correlators.

7. (Currently Amended) A receiver for a multi-carrier CDMA system for receiving a signal transmitted having a known pilot sequence on plural sub-carriers, comprising:

a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide ~~plural~~ different data sub-carrier baseband signals;

a composite down-converter down-converting the received signal to a composite baseband signal;

a delay and channel estimator operatively coupled to the composite down converter correlating the composite baseband signal with a composite of the known pilot sequence to produce an estimate of channel gain and multi-path delay; and

a plurality of demodulators, each operatively connected to one of the sub-carrier down-converters and filters and to the delay and channel estimator, each demodulating one of the ~~plural~~ different data sub-carrier baseband signals using the estimate of channel gain and multi-path delay.

8. (Original) The receiver of claim 7 wherein the composite down converter down-converts the received signal relative to a center carrier frequency and the sub-carriers are separated with respect to the center carrier frequency.

9. (Original) The receiver of claim 8 wherein the composite of the known pilot sequence comprises a sum of the known pilot sequences.

10. (~~Currently Amended~~) The receiver of claim 7 further comprising a plurality of correlators, one for each down-converter, each correlating one of the different data sub-carrier baseband signals with the known pilot sequence for one of the sub-carriers, to produce an estimate of channel gain and multi-path delay, and wherein the plurality of demodulators selectively demodulate the ~~plural~~ different data sub-carrier baseband signals using either the estimate of channel gain and multi-path delay produced by the delay and channel estimator or the estimate of channel gain and multi-path delay produced by the plurality of correlators.

11. (~~Currently Amended~~) A receiver for a multi-carrier CDMA system for receiving a signal transmitted on plural sub-carriers each having a known pilot sequence, comprising:

a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide ~~plural~~ different data sub-carrier baseband signals;

a delay and channel estimator comprising a plurality of correlators, each correlating one of the different data sub-carrier baseband signals with the known pilot sequence for the one sub-carrier, and operative to combine outputs of the plurality of correlators to produce an estimate of channel gain and multi-path delay; and

a plurality of demodulators, one for each of the plural sub-carriers and operatively coupled to the delay and channel estimator, each demodulating one of the ~~plural~~ different data baseband signals using the estimate of channel gain and multi-path delay.

12. (Original) The receiver of claim 11 wherein the delay and channel estimator identifies multi-paths and relative delays for the multi-paths using threshold comparison.

13. (Currently Amended) A method of synthesizing a radio channel profile for a multi-carrier CDMA receiver receiving a signal transmitted on plural sub-carriers, comprising:

down-converting the received signal to baseband and removing the other sub-carriers to provide plural different data sub-carrier baseband signals;

correlating each of the different data sub-carrier baseband signals with a known pilot sequence to provide correlated different data sub-carrier baseband signals;

sampling each of the correlated different data sub-carrier baseband signals;

transforming each of the sampled, correlated different data sub-carrier baseband signals to a discrete time frequency domain;

combining the transformed baseband signals to produce a combined discrete time frequency domain signal; and

inverse transforming the combined discrete time frequency domain signal to produce a composite correlation output signal.

14. (Currently Amended) The method of claim 13 wherein sampling each of the different data correlated sub-carrier baseband signals comprises sampling each of the correlated sub-carrier baseband signals at Nyquist rate.

15. (Currently Amended) The method of claim 13 wherein sampling each of the different data correlated sub-carrier baseband signals comprises sampling each of the different data correlated sub-carrier baseband signals at greater than Nyquist rate.

16. (Currently Amended) The method of claim 13 wherein transforming each of the sampled, different data correlated sub-carrier baseband signals to a discrete time frequency domain comprises forming discrete Fourier transforms for each of the sampled, different data correlated sub-carrier baseband signals.

17. (~~Currently Amended~~) The method of claim 13 wherein combining the transformed baseband signals to produce a combined discrete ~~time~~ frequency domain signal comprises computing a carrier frequency offset in ~~time~~ frequency domain for each of the sub-carriers and summing the transformed baseband signals using the carrier frequency offsets in the ~~time~~ frequency domain.

18. (~~Currently Amended~~) The method of claim 16 wherein inverse transforming the combined discrete ~~time~~ frequency domain signal to produce a composite correlation output signal comprises calculating an inverse discrete Fourier transform for the combined discrete ~~time~~ frequency domain signal.

19. (~~Currently Amended~~) A mobile terminal for a multi-carrier CDMA system comprising:

a receiver for receiving a signal transmitted on plural sub-carriers each having a known pilot sequence comprising a plurality of down-converters down-converting the received signal to different data baseband signals, a delay and channel estimator correlating at least one of the different data baseband signals with a single wideband pilot signal, the single wideband pilot signal comprising ~~all~~ more than one of the known pilot sequences, to produce an estimate of channel gain and multi-path delay, and a plurality of demodulators, one for each of the plural sub-carriers, and operatively coupled to the delay and channel estimator, each demodulating one of the ~~plural~~ different data baseband signals using the estimate of channel gain and multi-path delay.

20. (Original) The mobile terminal of claim 19 wherein the plurality of down-converters comprise one for each sub-carrier.

21. (Original) The mobile terminal of claim 19 wherein the plurality of down-converters comprise a plurality of sub-carrier down-converters, one for each sub-carrier, and a composite down-converter down-converting the received signal to a composite baseband signal.

22. (Original) The mobile terminal of claim 21 wherein the delay and channel estimator is operatively coupled to the composite down converter for correlating the composite baseband signal with a composite of the known pilot sequence to produce an estimate of channel gain and multi-path delay.

23. (Original) The mobile terminal of claim 19 wherein the delay and channel estimator comprises a plurality of correlators, one for each sub-carrier, and outputs of each of the plurality of correlators are combined to produce the estimate of channel gain and multi-path delay.

24. (~~Currently Amended~~) The mobile terminal of claim 19 further comprising a plurality of correlators, one for each down-converter, each correlating one of the different data baseband signals with the known pilot sequence for one of the sub-carriers, to produce an estimate of channel gain and multi-path delay, and wherein the plurality of demodulators selectively demodulate the ~~plural~~ different data baseband signals using either the estimate of channel gain and multi-path delay produced by the delay and channel estimator or the estimate of channel gain and multi-path delay produced by the plurality of correlators.

25. (~~Currently Amended~~) A base station for a multi-carrier CDMA system comprising:

a receiver for receiving a signal transmitted on plural sub-carriers each having a known pilot sequence comprising a plurality of down-converters down-converting the received signal to different data baseband signals, a delay and channel estimator correlating at least one of the different data baseband signals with a single wideband pilot signal, the single wideband pilot signal comprising ~~all~~ more than one of the known pilot sequences, to produce an estimate of channel gain and multi-path delay, and a plurality of demodulators, one for each of the plural sub-carriers, and operatively coupled to the delay and channel estimator, each demodulating one of the

~~plural~~ different data baseband signals using the estimate of channel gain and multi-path delay.

26. (Original) The base station of claim 25 wherein the plurality of down-converters comprise one for each sub-carrier.

27. (Original) The base station of claim 25 wherein the plurality of down-converters comprise a plurality of sub-carrier down-converters, one for each sub-carrier, and a composite down-converter down-converting the received signal to a composite baseband signal.

28. (Original) The base station of claim 27 wherein the delay and channel estimator is operatively coupled to the composite down converter for correlating the composite baseband signal with a composite of the known pilot sequence to produce an estimate of channel gain and multi-path delay.

29. (Original) The base station of claim 25 wherein the delay and channel estimator comprises a plurality of correlators, one for each sub-carrier, and outputs of each of the plurality of correlators are combined to produce the estimate of channel gain and multi-path delay.

30. (~~Currently~~ Amended) The base station of claim 25 further comprising a plurality of correlators, one for each down-converter, each correlating one of the different data baseband signals with the known pilot sequence for one of the sub-carriers, to produce an estimate of channel gain and multi-path delay, and wherein the plurality of demodulators selectively demodulate the ~~plural~~ different data baseband signals using either the estimate of channel gain and multi-path delay produced by the delay and channel estimator or the estimate of channel gain and multi-path delay produced by the plurality of correlators.

31. (New) A method of synthesizing a radio channel profile for a multi-carrier CDMA receiver receiving a signal transmitted on plural sub-carriers, comprising:

down-converting the received signal to baseband and removing the other sub-carriers to provide different data sub-carrier baseband signals;

correlating each of the different data sub-carrier baseband signals with a known pilot sequence to provide correlated different data sub-carrier baseband signals;

sampling each of the correlated different data sub-carrier baseband signals;

and

combining the correlated different data sub-carrier baseband signals to produce a combined signal.
